

Organized by:



Hosted by:



Supported by:



Date: Monday, December 7th 2015 / 4h00 - 6h00 pm

Address: Tour Eqho | 2, avenue Gambetta CS 60055, 92066 PARIS LA DEFENSE Cedex

Side Event COP 21: how cities can help to achieve Intended Nationally Determined Contributions, INDCs?

Dr^a. Suzana Kahn
Professor COPPE/UFRJ
Green Fund Coordinator
President of the Brazilian Panel on Climate Change Scientific Committee



Climate Context

- *CO₂ as main GHG;*
- *GHG emissions growth - 49 GtCO₂eq/year in 2010 (highest in history)*
- *80% of emission increase is due to fossil fuel.*
- *The annual emissions are greater than the level consistent with the objective of 2°C at the end of the century (estimated 50 GtCO₂eq base year 2010), i.e. 20% more than in 2000.*
- *Countries presented their pledges but there is much doubt about compliance. If they meet what they promised the gap will be 12 GtCO₂eq in 2030.*
- *In other words: There is a gap of 12 GtCO₂eq by 2030, to bring emissions to 42 GtCO₂eq. The expectation is that we are in 2030 with an emission of 54 GtCO₂eq.*

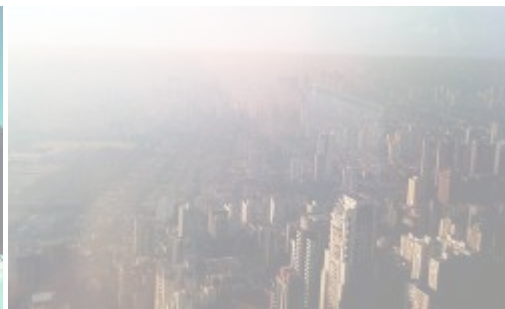


INDCs & Emissions Gap 2015

- **119** Intended Nationally Determined Contributions (**INDCs**) submitted to the UNFCCC Secretariat by the 1st of October 2015.
- The submitted INDCs reduce the global GHG emission level by around **7.3 GtCO₂e** compared to current policy projected levels.

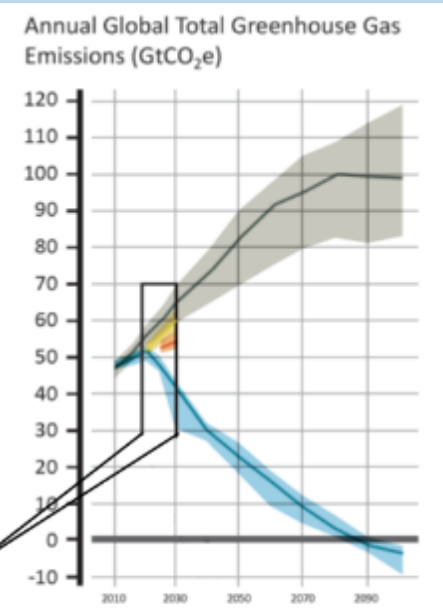
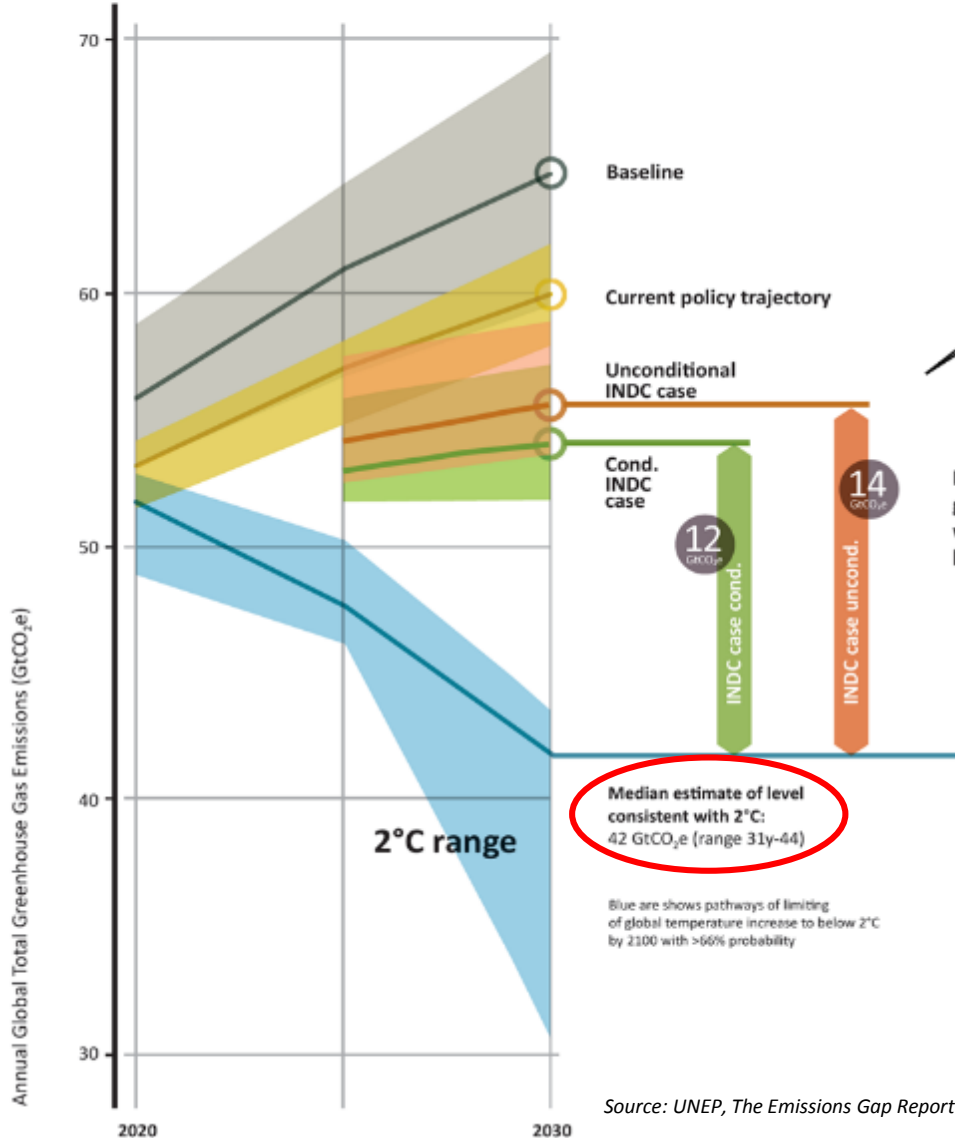
BUT ...

- Mitigation efforts of INDCs are insufficient for keeping global average surface temperatures below 2 C.
- ⇒ There is a **gap** between mitigation pledges and the necessary GHG emissions reduction by 2100.



Emissions Gap 2015

Figure 1: The emissions gap

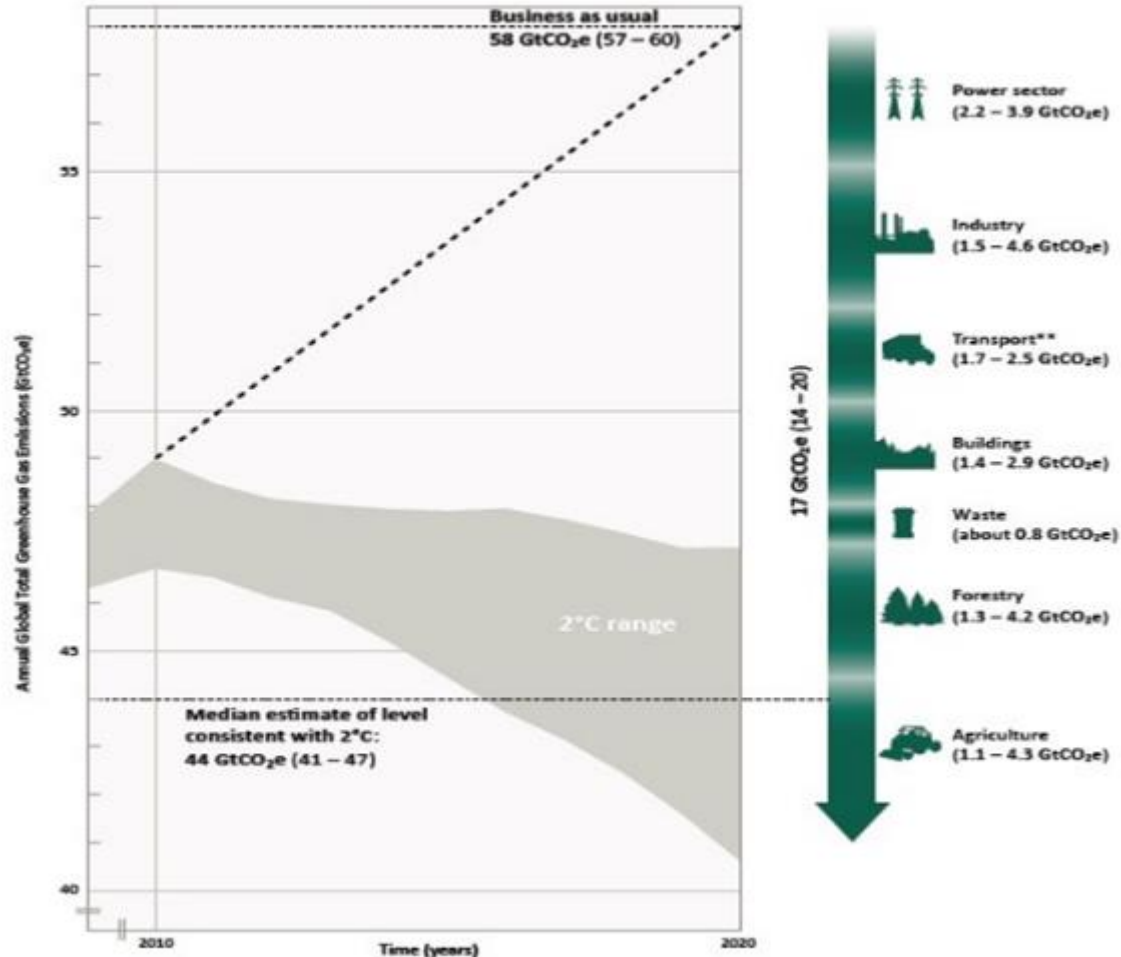


Remaining gap to stay within 2°C limit



How reduce this Gap?

Figure 2: How to bridge the gap: Results from sectoral policy analysis



*based on results from Bridging the Emissions Gap Report 2011
**including shipping and aviation

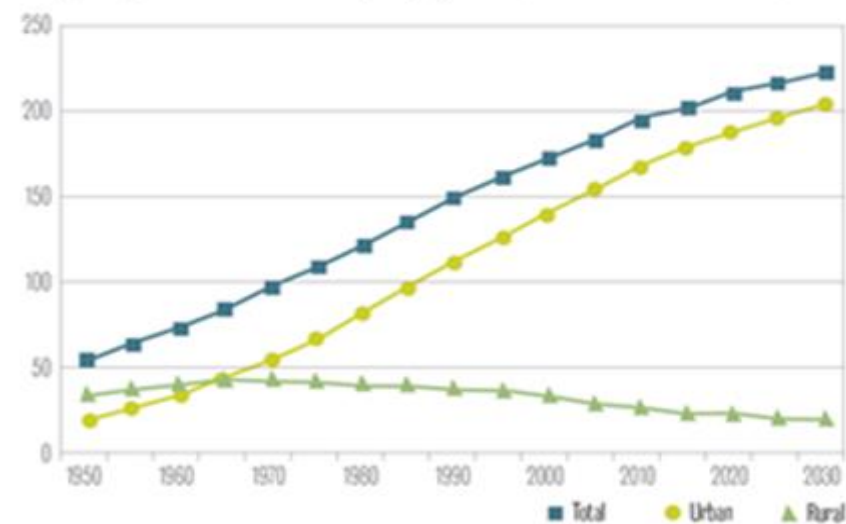
Brazilian INDC

- *Brazil's INDC has a broad scope including mitigation, adaptation and means of implementation consistent with the contributions' purpose to achieve the ultimate objective of the convention.*
- *Intended contribution:*
 - ***Reducing GHG emissions by 37% below 2005 levels in 2025.***
 - ***Reducing GHG emissions by 43% below 2005 levels in 2030.***
- *The Brazilian contribution builds on the emission reduction results from the last decade, mainly due to the **80% reduction of deforestation in the Amazon**, together with the expansion measures on the areas of **renewable energy, energy efficiency and sustainable agriculture**.*



The Importance of Cities

Figure 3: Brazilian population and projections (in millions of inhabitants)



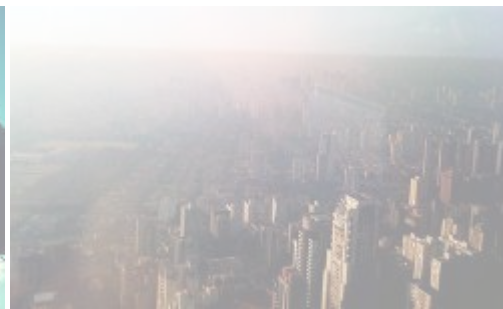
Source: IBGE, Brazilian Institute of Geography and Statistics

Figure 4: Energy consumption by sectors (2013)

Energy consumption by sectors (2013)

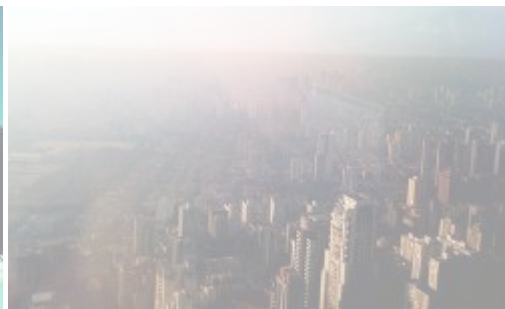


Source: EPE, National energy balance report 2014



The Potential Contribution of Cities to Mitigation Measures

- ***Urbanization is a global trend transforming societies and energy use.*** By 1900 the global population was 1.6 billion and only 13% of this population were living in urban areas (about 200 million). Today more than half of the world's population (3.6 billion) are living in cities. By 2050 the urban population is expected to grow to 5.6-7.1 billion, it means 64-69% of the world's population.
- ***Cities consume more than half of the world's primary energy with corresponding CO₂ emissions.*** The precise contribution of cities in energy consumption and CO₂ emissions vary with the method of account.
 - 67-76% of global energy consumption
 - 71-76% of CO₂ related emissions
 - 44% of emissions



The Role of Brazilian Cities

- *Although Brazil has already made strides in reducing emissions from deforestation and integrating renewables in the power supply, there is room for Brazilian cities to take action and enhance mitigation ambition, particularly in the buildings, transportation and waste sectors.*
- *In addition to reducing GHG emissions, city action on climate change improves the air quality, catalyzes economic development, and promotes advances on social outcomes.*



The Role of Brazilian Cities

- *Urban abatement is critical to reducing emission in Brazil over the long term. The national actions of reducing deforestation and clean energy generation have produced laudable near-term reductions; moving forward, cities can enhance the national climate strategy.*
- *Cities need support to maximize the effectiveness of their actions. Examples of national policies to support urban action include carbon pricing and support for distributed renewable energy production in urban areas by permitting integration into the national grid.*



The Role of Brazilian Cities

- *The strongest tool Brazilian cities have for climate action is their political influence. This influence could be leveraged to strengthen the ambition of Brazil's national GHG emission reduction commitments.*
- *Cities have a responsibility to contribute to reduce emissions. Cities no longer have to choose between economic growth and emission reduction – they can do both.*



Rio de Janeiro City Example

Table 1: Annual GHG emissions of major Brazilian cities

City	Emissions	Year of inventory
São Paulo	15 Mt CO ₂ e	2009
Rio de Janeiro	22 Mt CO ₂ e	2012
Curitiba	3 Mt CO ₂ e	2008
Belo Horizonte	2 Mt CO ₂ e	2007

Source: Prefeitura de São Paulo (2014), Prefeitura do Rio de Janeiro (2013), Prefeitura Curitiba (2012), and Prefeitura de Belo Horizonte (2009).

Table 2: GHG emissions per sector in Rio de Janeiro, 2012

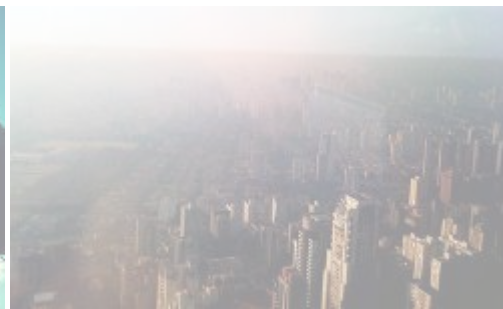
Sector	% of GHG emissions
Energy	73%
Waste	21%
Industries	4%
Agriculture & land use	2%

Source: Rio de Janeiro's Climate Change Plan.

Table 3: Potential energy-related GHG emission reductions (tCO₂e)

Measure	2016	2020	2025
Reduced emissions/energy (fixed sources)	740	740	740
Installation of LED traffic lights (32,000 units)	640	640	640
My House, My Life project (1,000 units)	100	100	100
Reduced emissions/energy (fugitive emissions)	17,000	11,400	11,400
Replacement of gas network	17,000	11,400	11,400
Reduced emissions/energy (mobile source)	525,00	529,700	530,400
BRT – TransOeste (150,000 passengers/day)	15,500	19,200	19,300
BRT – TransCarioca (380,000 passengers/day)	48,200	48,700	48,900
BRT – 2nd phase TransCarioca (150,000 passengers/day)	19,000	19,200	19,300
BRT – TransOlimpica (100,000 passengers/day)	12,700	12,800	12,900
BRT- Transbrasil (900,000 passengers/day)	115,700	115,900	116,100
BRS Copacabana	17,600	17,600	17,300
Metro Jardim Oceanico (230,000 passengers/day)	85,500	85,500	85,500
Metro – new higher-capacity cars (+550,000 passengers/day)	204,400	204,400	204,400
Expansion of cycle path (300km)	640	640	640
	542,74	541,84	542,54

Source: Rio de Janeiro's Climate Change Plan.



Brazilian Cities Mitigation Potential

- *Brazilian cities could achieve energy savings of 50% in new buildings and 30% in retrofits.*
- *Infrastructure improvements to transportation and decreased reliance on personal vehicles, are projected to reduce GHG emissions from road transport by 19.5 Mt CO₂e by 2020.*
- *National policy for solid waste will decrease waste generation, increase recycling and reuse, manage and dispose of solid waste properly and provide universal basic sanitation.*



UFRJ Campus as a City Lab

- *If we want to achieve a sustainable future, higher education institutions should provide the awareness, knowledge, skills and values which enable individuals to pursue life goals in a more sustainable way. (Cortes, 1999)*
- *Higher education institutions can be described as a "microcosm" of environmental problems which have been faced by the society in a range of ways.*



UFRJ Campus as a City Lab

- *The "Living Lab" is a living and permanent laboratory located within a delimited area (e.g. cities). This place concentrates all the technological developments and also allows partial transfer of these innovations for a real environment.*
- *In Europe the concept of living laboratory means the implementation of the so called "smart cities". The idea is to involve diverse stakeholders in the innovation process in order to exchange experiences and knowledge with the users in a real environment.*



UFRJ Campus in Numbers



Area	5,2 km ²
Estimated population	60.000
People circulation/day	100.000
Vehicles circulation/day	25.000
Energy consumption/year	70.000 MWh
Water consumption/year	1.08 million m ³



Green Fund

Aim:

Develop and financing projects in the infrastructure and energy fields.



Target:

Strengthen as if a *Benchmarking* in sustainability, innovation and cutting edge technology.



Space for creativity



Financing:

Fund made up by the exempt of an Cidade Universitária UFRJ campus energy consumption taxation (ICMS tax)

Management:

A council formed by public and private sector, plus researches with largely known in sustainability areas and universities administration.



Consumption and Emission Indicators: Data Virtualization

RED HAT JBOSS DATA VIRTUALIZATION

Registrado como
tvUser

Sair

[Página Inicial](#)

[Centros UFRJ](#)

Indicadores

[Água](#)

[Resíduos](#)

[Energia](#)

[Biodiversidade](#)

[Mobilidade](#)

Mobilidade:

- Fluxo de veículos:

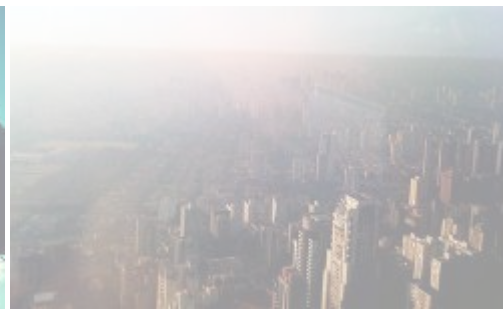
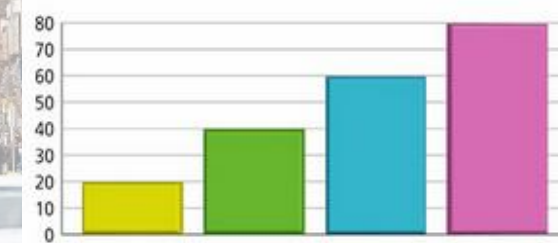
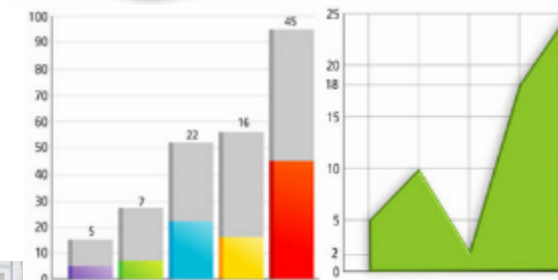
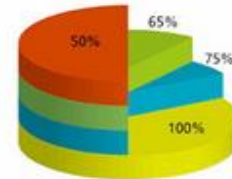
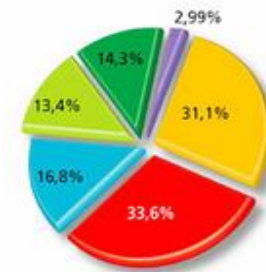
- Total de carros que entram no Fundão por dia e no período das 07h00min as 09h00min.
- Quantidade de carros que entram no Fundão por dia.
- Quantidade de carros que entram, saem e os que permanecem no Fundão por hora nos últimos 30 dias.
- Total de carros que permanecem no Fundão por dia.
- Quantidade de carros que utilizam o Fundão como passagem por dia.

- Frota de ônibus Circulares UFRJ:

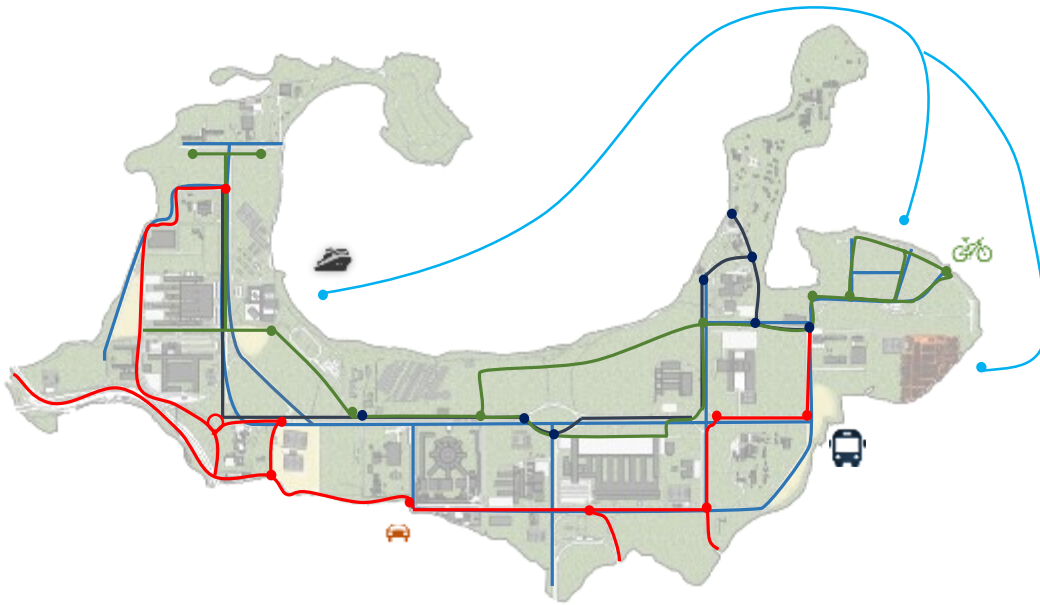
- Tempo de viagem por linha.
- Tempo de viagem médio por dia, por linha.
- Velocidade média do ônibus com distância entre os pontos de parada.
- Tempo de viagem entre os pontos de parada estratégicos.
- Tempo de viagem médio entre os pontos de parada estratégicos por dia.
- Tempo de viagem médio entre os horários de 7:00 as 9:00 e de 16:00 as 19:00.

- Frota de carros oficiais UFRJ:

- Gasto por mês por carro da frota oficial por veículo.
- Custo de manutenção por mês por veículo.
- Valor gasto em combustível por mês por veículo.
- Consumo de combustível por mês por veículo.
- Total de Quilômetros percorridos por mês pela frota e por veículo.
- Quilometragem percorrida por Litro de combustível, por mês e por veículo.



Laboratory of Urban Mobility



- *The UFRJ aims to implement a system integration between different modalities of transport.*
- *The connectivity will provide an agile internal mobility, efficient and less emissive.*



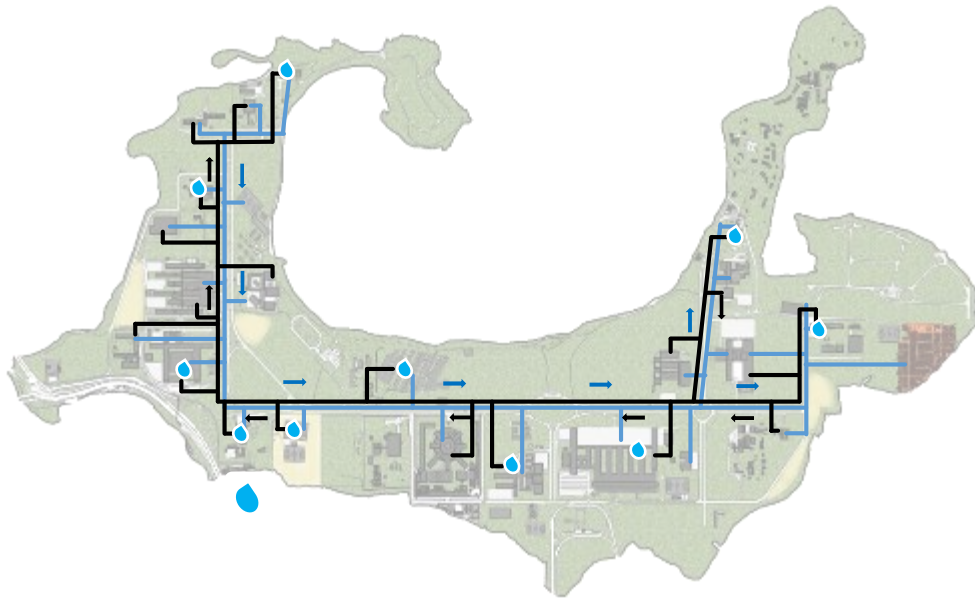
Laboratory of Energy Consumption and Generation



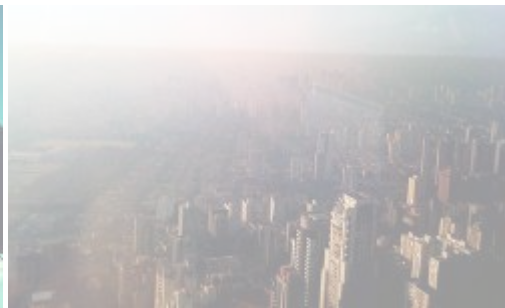
- *The UFRJ intends to implement clean energy technologies such as photovoltaic solar panels and also reducing the energy demand through "smart grid" and other energy efficiency measures.*
- *Consumption data will be monitored aiming at a continuous control of the energy consumption on campus.*



Laboratory of Sustainable Construction



- *The UFRJ aims to promote a mindful use and recycling of water employing the use of "gray water" and rainwater drainage.*
- *In order to reduce the campus energy consumption, changes on the built environment will be implemented.*
- *The Laboratory of Sustainable Construction will produce building materials for construction work on the campus.*



Benefits of using UFRJ Campus as Urban Lab

1

To become a pilot experience for performance evaluation of urban technologies and practices through a system of sustainability monitoring on the campus.

2

Being a laboratory of new technologies and sustainable urban practices.

3

To promote an environmental awareness and highlight the importance of change on consumption patterns.

4

Replicate the initiatives in different urban areas.



University City: Living Lab

FUNDO VERDE



CCS Water:

- Water reuse
- Reduction of water consumption
- Initiatives can save 140.000 L/day

Emission App:

- Emission measurement APP
- Stimulate a social behaviour change

Energy:

- Solar roof installation project
- Capacity to generate 450 MWh/year

Mobility program:

- New bicycle stand installation (10 - 200 units)
- New bicycle paths construction
- Car and bike sharing ongoing projects.



LED: replacement of conventional bulbs for LED

Potential for photovoltaic energy generation on "Ilha do Fundão":

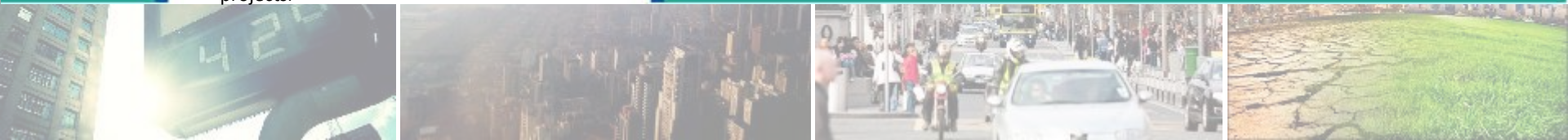
- A roof area generates solar power capacity greater than its current energy consumption.

Carpooling:

- project to build app which provides greater security.

Power substations:

- Smart energy meters installation aiming at optimal energy management.
- Conduct efforts on reduction of energy consumption
- Reduce unplanned energy shutdown episodes.



Final Remarks

There is a major challenge in the near future to radically reduce the GHG emissions keeping global average surface temperatures below 2 C until the end of the century.

To achieve this target, there is an urgent need of an extensive portfolio for technology and mitigation policies, and particularly a transformation in consumption patterns.

